

# Glass Beads in Asia

## Part I. Introduction

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BEADS ARE excellent type fossils. Their small size, portability, scarcity, and attractiveness made them ubiquitous trade objects. Although in terms of bulk and value they played lesser roles than textiles, spices, or foodstuffs, their durability has favored their preservation. Beads of considerable age are still worn in some areas, they were common burial offerings, and those lost long ago can be recovered archaeologically. Properly studied, they have proven to be sensitive markers of many human activities, including aspects of past behavior that are otherwise obscure. Correctly evaluated, beads may significantly supplement the data obtained from the study of stone tools and ceramics.

Glass is the premier bead material. Invented in the Middle East around 2500 B.C., glassmaking spread slowly. The first indigenously made glass of Asia is found in Chinese and Indian beads dating from the eleventh century B.C. (Yang 1985:26; Francis 1984). The key to glassmaking is skilled labor. More of an art than a science, glassmaking is mastered through experience and by trial and error, and skills are usually passed down through a family. The basic raw materials for glass are abundant; the exotic mineral salts used to color, opacify, or decolorize it are not really necessary for its production. Glass is attractive, can assume an almost infinite variety of shapes and colors, and is durable under a wide range of conditions. Glassmakers are often few and far between, and their product has often been regarded as special, even semimagical (Schenk 1963:257; Hammell 1983).

The great variety of glass beads in Asia reflects movements of peoples, ideas, and goods, whose history is imperfectly understood and the subject of much debate. Although a study of beads cannot solve all these problems, it might reasonably be expected to furnish new data on socioeconomic relations and even to offer chronological clues. At a minimum, it should provide data on a sophisticated technology and the area's trade.

Beads are important in the lives of many Asians and were often even more important to their ancestors or those who once occupied the same territory. The scientific inquiry into the origin and history of beads, however, has been limited. Borneo may be cited as a typical example. Early ethnographers mentioned the value placed on beads only in passing (Wood 1870:460–461; Roth 1896:39–76). Hose and

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McDougall published some information on Borneo beads, but only with brief notes (1912: vol. 2, 226–228, pl. 130). By mid-century the beads of Sarawak and Brunei had a champion in Harrison (1950). The Sarawak Museum has published a short monograph on beads (Dunsmore 1978), and work has been conducted by Munan-Oettli (1981, 1983, 1987). Few of these studies have been archaeological in nature, nearly all were ethnographic.

The same is true for most other countries in Asia. Bead research has been conducted in villages, in museums, or even using private collections. Few analyses of these beads have been carried out, and almost no comparative work has been done with beads from other parts of the world. Bead research is a highly specialized and rather new field of inquiry, and the progress made elsewhere has not always been matched in Asia. This has resulted in misconceptions and misidentifications, so that one task we face is to examine some preconceived notions critically. Fox's warning that Philippine heirloom beads are not as ancient as many had thought (1977:760) may stand as a caution about most other heirloom beads in the region.

### THE SCOPE OF THIS STUDY

The literature on glass beads in Asia is too often limited by the lack of an understanding of beads on a global basis. This paper offers new interpretations of some established views, based on recent advances in bead studies. Our interest is limited to South Asia and East Asia, with particular attention paid to the peripheral regions. The two great glass beadmaking powers of Asia—China and India—are discussed primarily for comparative purposes. In the case of China, although it has now become clear that it was a major beadmaking power (Francis 1986*a*, 1986*b*), our knowledge of Chinese beadmaking is still fragmentary and is restricted principally to documentary evidence. As for India, although a great deal is known of its beadmaking (Francis 1982*a*), Indian bead production is complex and is still under investigation.

There are many ways to form a bit of glass into a bead (Francis 1982*b*:6–8, 1983), and knowing how a bead was made is vital to study and categorize it properly. Techniques used to make Asian beads will be discussed in detail in subsequent installments of this series. For the moment, the reader should be familiar with two beadmaking terms (see Fig. 1):

1. *Drawn beads*. These are beads made from a glass tube, which has been drawn or pulled out of a glass batch. The tubes are cut into short segments, which are usually agitated over heat to smooth off the sharp edges. Drawn beads can be distinguished because their fabric and any inclusions run parallel to their perforation. The most common of these beads, and the ones most ubiquitous in the region, are small (usually under 6 mm in diameter), monochrome drawn beads with a distribution ranging from South Africa to Korea. They are called *Indo-Pacific beads*.

2. *Wound beads*. These are made by wrapping molten glass around a rod, stick, or wire. Once the bead is built up, it can be further pressed or paddled into shape, placed in a mold, or decorated with other colors of glass. Wound beads are distinguished by having their fabric and inclusions encircling the perforation; they are often less regular than drawn beads. Unlike the Indo-Pacific drawn beads, they are usually much more limited in their distributions.

To discuss Asian glass beads properly, it is necessary to distinguish between beads that are *found* in Asia and those that have been *produced* there. The question of foreign

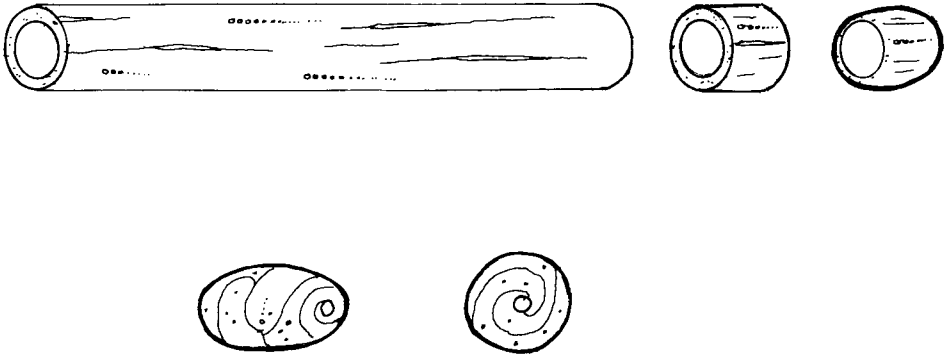


Fig. 1. A diagram showing the difference between drawn and wound beads. In the upper register, a drawn glass tube is cut into short segments, which are usually reheated to round them off. Air bubbles and other inclusions are stretched parallel along the perforation. In the lower register, wound beads show fabric and inclusions encircling the perforation, sometimes most visible at the ends.

(non-Asian) influence on Asian beads is, therefore, the first one we shall consider. In some cases this influence has been overstressed, and in other cases unfortunately ignored. Three major problems need to be discussed in this connection: (1) Did the early Asia beadmakers make their own glass, or did they make beads from imported glass? (2) Is there substantial evidence for "Roman" beads in the region? (3) Which of the beads in the region are modern European in origin? In subsequent parts of this study we shall consider the evidence for the local manufacture and trade of various types of indigenous Asian glass beads.

### THE ORIGIN OF THE GLASS FOR INDO-PACIFIC BEADS

The origins of Asian glass are not entirely clear, but it appears that both China and India developed glass independently of each other and of outside influences, although the possibility of their trying to imitate an imported product is admitted. The earliest Chinese glass—the type used for a very long period—was different from glass made elsewhere, and it appears that glassmaking may have developed from metallurgical activities (Francis 1986a:3–7). In India, glass may have developed from a highly skilled and inventive faience industry—a problem still under investigation.

Although ancient glass has received considerable attention from many scholars, Asian glass and glass beads have both been largely overlooked. In the Asian context, beads were a most important glass product, and attention devoted to them will shed much light on the questions of Asian glass in general.

It has often been suggested that early Asian glass products were made from glass brought from the West in the form of scrap glass, which was remelted and made into beads and other objects. It has been pointed out that the anonymous author of the *Periplus of the Erythraean Sea* in the mid or late first century A.D. listed scrap glass as an article of commerce to be shipped to southwestern India (section 56). It has been suggested that this was a widespread practice (Stern 1986) and further stated that the glass was probably used to make beads and bangles (Engle 1976:124). Tornati and

van der Sleen considered this question, dismissing the possibility in regards to Arikamedu in southeastern India (1960:21–22). After finding two punty-caps [pieces of glass used to attach bottles or other objects to iron rods (punties) while being worked] at Pengkalen Bujang, Malaysia, Lamb suggested a Western source for the glass used for beadmaking there (1961*a*:26; 1965*a*:36; 1965*b*:39–40; 1965*c*:108). This ethnocentric view is probably even more widely held than it is found in print.

One method of solving this problem is through the aid of glass analyses. Relatively few analyses of Asian glass have been completed, although more are currently being conducted. For our purposes published analyses of the ubiquitous Indo-Pacific beads from various Asian sites during the early historic and the medieval periods are compared with glass from other regions of the world. Before considering these analyses, it is instructive to understand something about them. While they may furnish us many clues, they do not speak for themselves; archaeologists must learn how to interpret them. A brief overview of this increasingly important investigative tool may be useful.

### GLASS ANALYSIS

The most common way to analyze glass is by the tedious process of separating ingredients chemically (wet analysis). Among other methods, arc spectrography has been available the longest, but is not as accurate as other techniques, and it destroys the sample, as does wet chemical analysis. X-ray fluorescence and the related electron microprobe are nondestructive and, especially the latter, can analyze very small objects, although only on the surface. Neutron activation is destructive and requires the most complex equipment, but needs only a small sample (Smith 1963).

Results are reported in percentage of weight. Often not all elements are reported, because they have not been searched for. Closely allied groups, such as iron and aluminum or the alkalis, may not be separated; this is most annoying. Since there is always some error, totals rarely add up to 100%, unless the silica was determined by balance, that is, subtracting the weights of the other ingredients from 100. Usually oxides are reported; when metals are reported alone, their percentage is lower. There is no agreement among scholars as to which oxides of a given metal are present, e.g., MnO or Mn<sub>2</sub>O<sub>3</sub> (Weyl 1959:121). Ingredients are spoken of as both the element and its oxide, for example, aluminum and alumina, sodium and soda.

Ancient glass ingredients were never pure and were further contaminated by the melting crucible and even trace elements from the air. Different analysts or even the same worker on different days may produce varying results on the same piece of glass. Glass is not entirely homogeneous, especially when corroded, as alkalis leach out first from the surface. All of these factors help complicate the picture. However, there are some basic things to look for in glass analyses:

1. *The ratio of the major ingredients.* Ordinary (nonlead) glass usually contains as necessary ingredients from 60% to 70% silica (SiO<sub>2</sub>); 15% to 20% alkalis, soda (Na<sub>2</sub>O), and potash (K<sub>2</sub>O); and 2% to 8% lime (CaO). As common impurities, it contains 1% to 5% alumina (Al<sub>2</sub>O<sub>3</sub>), magnesia (MgO), and iron (Fe), and somewhat less manganese (Mn) (Turner 1956*a*:175T–178T; Cayley 1962:68–71, 84–85, 98–101). Curiously, ancient glassmakers seem to have been unaware of the need to add lime to stabilize glass, and it must have been included simply as an impurity (Turner 1956*b*:45T–46T).

2. *The presence of lead.* The weight of lead (Pb) may skew the ratios considerably. Lead is a glass-former like silica, and glass with up to 90% lead is known. Lead is compatible with all ratios of other ingredients. Small amounts help metals melt more easily, especially copper (CuO) for opaque red glass and tin (Sn) and antimony (Sb), the common ancient opacifiers. When its ratio reaches 30% or so we speak of lead glass (crystal, paste), which is brilliant and softer than ordinary glass (Bick and Bayley 1979:16–17). Brill suggests that purposeful addition of lead cannot be assumed until it reaches about 5% concentration (1970:120), although Henderson discusses a level as low as 3% as being purposeful (1985:282).

3. *The ratio of the alkalis.* Soda and potash are fluxes used to lower the melting point of silica. There are various sources for them, which can sometimes be determined by their related impurities (Turner 1956c:283–291). Ashes are commonly used; depending upon the plant burned they may be mostly soda or potash. Soil salts (efflorescents) were often used in India (Francis 1982a:5–6) and in China (Francis 1986a:26–27); they are an impure soda, as is the natron used in Egypt.

4. *The oxides used for coloring glass.* Iron is a universal impurity and imparts a “bottle green” color to raw glass. Other colors were made by introducing metals into the batch. Copper and iron are extremely versatile, and the right amounts properly handled yield a wide range of colors. Cobalt, in proportions as small as 0.025%, can produce blue, and the typical rich cobalt blue needs only 0.1% (Turner 1959:274T). Manganese can color glass from pink to black, or it will balance the green of iron and decolorize glass, in which case it is called “glassmaker’s soap.” Black glass is usually deep manganese violet or deep iron green.

5. *Trace elements.* These are tiny amounts of metals, including even gold (Au) and silver (Ag), introduced accidentally in any number of ways. Their importance is that trace element patterns may help pinpoint origins.

## ANALYSES OF INDO-PACIFIC BEADS

Rather than reproduce all published analyses of Indo-Pacific beads, several groups are represented here only by mean averages; details of the sources for the tables and charts are included in the Appendix.

Table 1 gives the mean average concentration of Indo-Pacific beads (or glass) from several Asian sites. Two of these were beadmaking sites: Arikamedu in southeast India (Pondicherry) and Oc-co at the southern tip of Viet Nam, the port of ancient

TABLE 1. INDO-PACIFIC BEADS, CA. 200 B.C. TO 300 A.D.

ANALY- SIS	INGREDIENT									
	SiO <sub>2</sub>	Na <sub>2</sub> O	K <sub>2</sub> O	CaO	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	CuO	MnO	MgO	PbO
1.	66.15	14.04	3.93	3.95	1.30	4.64	1.60	0.14	2.01	0.013
2.	74.28	1.77	11.85	2.23	3.00	1.94	0.77	0.97	0.82	0.014
3.	57.40	22.47	—	3.70	2.95	7.86	3.82	0.075	1.84	—
4.	60.53	20.76	—	3.15	0.68	9.96	0.55	0.11	1.28	—
5.	63.34	18.0	1.8	7.0	1.6	4.7	1.0	0.05	2.1	0.10
6.	53.34	24.0	1.79	2.88	3.52	8.95	4.72	n.a.	0.75	none
7.	61.4	20.4	2.2	6.6	1.6	3.6	—	—	3.4	—
8.	63.0	19.6	Tr.	3.2	3.1	8.3	0.55	—	0.8	—
9.	72.2	6.7	10.5	3.4	2.5	1.5	0.55	0.9	0.7	—

Fu-nan. The other sites were apparently not beadmaking locations. The analyses listed in Table 1 are:

1. Four samples of opaque red glass from Arikamedu.
2. Five samples of various colored glasses from Arikamedu.
3. Two sample groups of red (and ochre) glass from Oc-eo.
4. Four sample groups of other colored glass from Oc-eo.
5. A red bead from a boat burial at Kampong Sungei Lang, Malaysia.
6. A red bead from a megalithic sarcophagus at Pasamah, Sumatra.
7. A gray-green bead from Thao Kham, Laos.
8. A blue bead from Ban Xot III, Laos.
9. A group of blue and green beads from Sa-huynh, Annam (Viet Nam).

It is clear from Table 1 and from Figures 2 and 3 that the glass of the Indo-Pacific beads from Asia is not all the same. The Arikamedu material alone shows considerable differences between the opaque red glass and the glasses of other colors, notably in their alkalies. Moreover, the glasses of Arikamedu and Oc-eo are quite different. The reds are similar, but Oc-eo used soda (and lots of it) for all colors, while Arikamedu used soda *only* for the red. The Oc-co material is also high in aluminum. The analyses from the other, nonbeadmaking sites tend to resemble one or the other of these beadmaking sites. The intra-site differences in these analyses will be discussed in detail in Part II of this paper, which will concentrate on the Indo-Pacific beads.

Figures 2 and 3 compare major elements in Arikamedu, Oc-eo, and other early Southeast Asian beads with contemporary Egyptian and Roman glass. The Asian glass is significantly different, indicating that it was locally made and not imported from the West. Western glass used soda exclusively as an alkali (Turner 1956a: 177T). Soda was used in red Arikamedu and all Oc-eo glass, but the potash of the other Arikamedu colors eliminates a Western origin for them. Furthermore, Asian red glass is markedly different from Western red glass in lead content. Virtually no lead is found in red Asian beads, but in the West large amounts were used from the third century B.C. through Roman times for this color (Brill 1970:120; Henderson 1985:279–280). Additionally, the Oc-eo glass has much more alumina, and all Asian glass much less manganese, than Western glass.

Analyses of Indo-Pacific beads from eighth- to fourteenth-century sites show patterns quite different from those of the earlier glass. Table 2 shows the mean average concentrations of medieval beads from sites in India, Thailand, Malaysia, Sarawak, and Flores (see Appendix). Analyses include:

1. Eight samples of opaque red glass beads.
2. Twenty-one samples of glass beads of other colors.

The medieval Indo-Pacific beads, no matter of what color, are all rather similar, with the only significant differences found in some of the alkalies. Most striking is the very high concentration of alumina and the low concentration of manganese. These beads differ from those of Arikamedu and Oc-co—from the former because of the high alumina and from the latter because of much less soda and more potash. They form a rather coherent group among themselves.

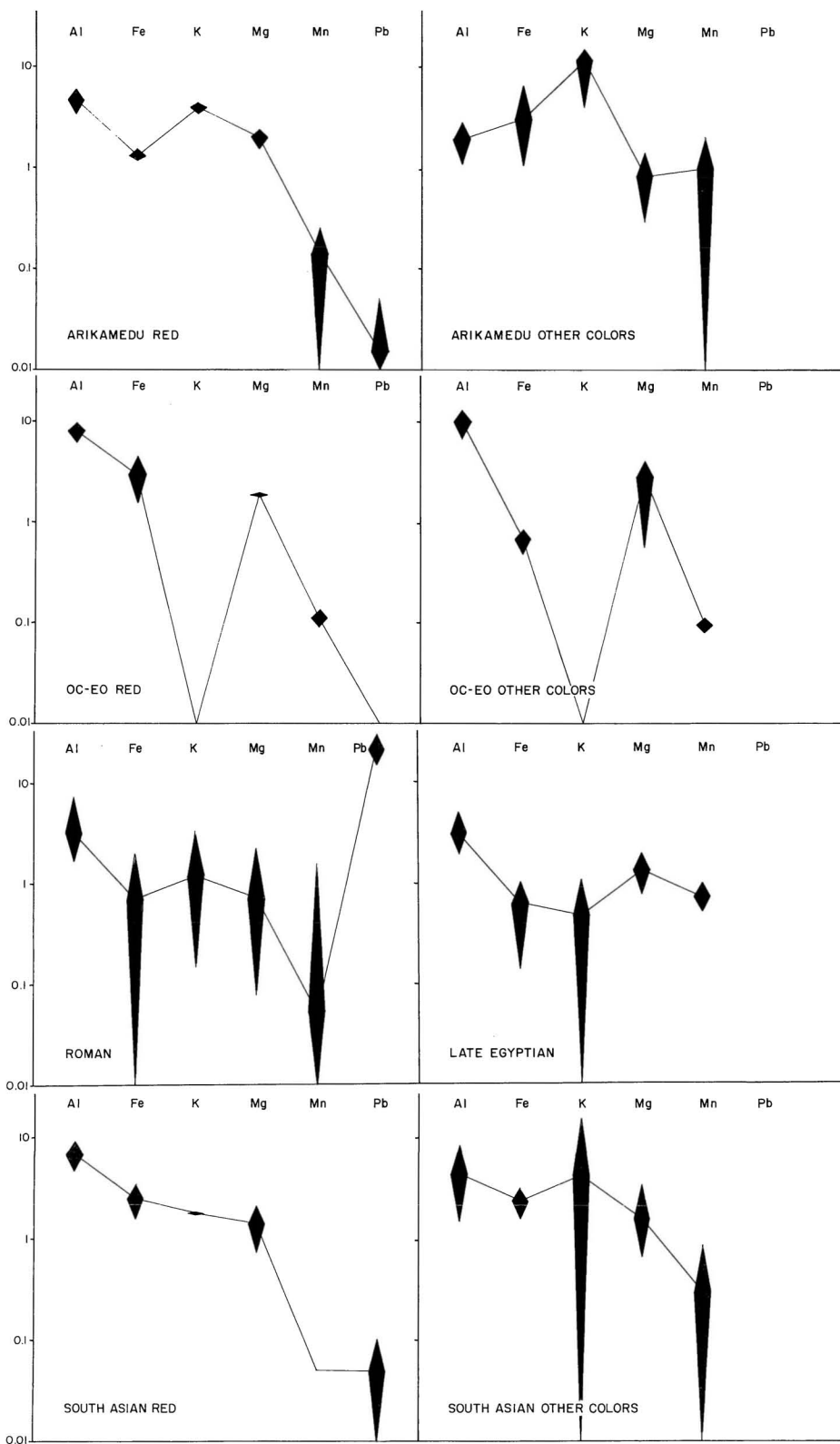


Fig. 2. Concentrations of selected ingredients in glasses of second century B.C. to fifth century A.D.

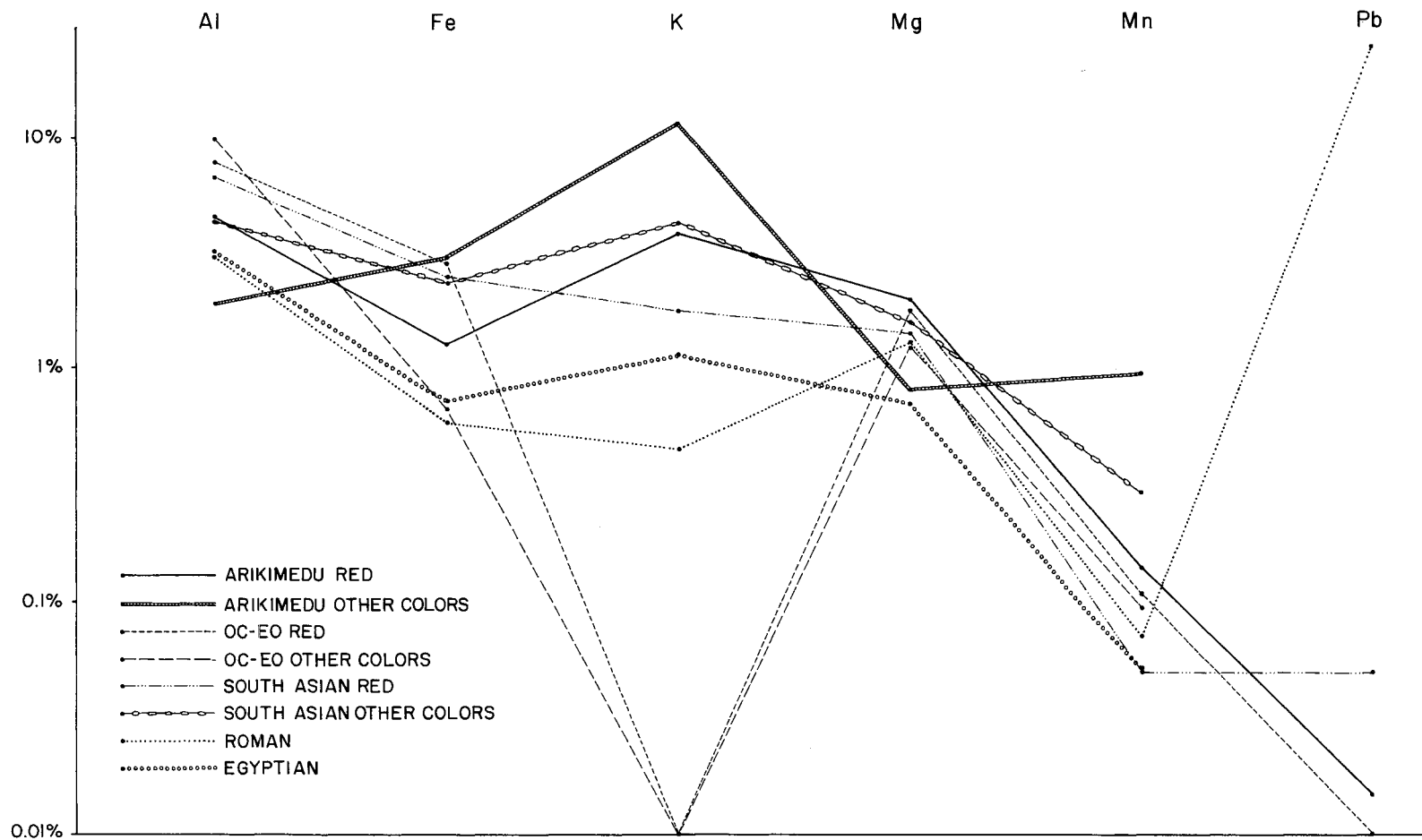


Fig. 3. Mean concentrations of selected ingredients in glasses of second century B.C. to fifth century A.D.



TABLE 2. INDO-PACIFIC BEADS FROM ASIA OF MEDIEVAL DATE

ANALY- sis	INGREDIENT									
	SiO <sub>2</sub>	Na <sub>2</sub> O	K <sub>2</sub> O	CaO	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	CuO	MnO	MgO	PbO
1.	67.37	11.10	2.41	3.08	0.81	11.64	0.55	0.016	0.21	0.68
2.	69.95	7.86	2.23	5.35	1.52	9.57	1.57	0.86	0.75	0.71

Figures 4 and 5 compare selected oxides in the medieval Indo-Pacific beads with those from contemporary glass from West Europe, the Islamic world, Russia, Central Asia, the Caucasian region, Byzantium, and the Balkans (Bulgaria). There is very close agreement among all the Western glasses, except that Russian and Georgian glass is especially pure in iron and West European and about half the Russian glass had potash as the alkali. The Asian glass, however, is very different. This is especially noticeable in the high concentration of aluminum, the low amount of magnesium, and the very low manganese. As with the earlier Indo-Pacific beads, this glass was a local product.

In conclusion, the analyses of Asian Indo-Pacific glass beads indicate that in both the early historic period and the medieval period the glass itself was made in Asia and not imported from the West. At Arikamedu distinct recipes were used for the opaque red glass and the glasses of other colors. This difference was not apparent at Oc-eo or in medieval times. These and other problems will be discussed at length in Part II of this study.

### "ROMAN" BEADS IN ASIA

Beads are small and travel well, and the occasional remarkable find of an ancient one borne great distances is to be expected. Unless direct commerce took place between two areas, however, this is a rare occurrence. Very few beads in the region can be legitimately ascribed to Roman manufacture. These include a mosaic eye bead from Mantai, Sri Lanka (Francis *n.d.a*; see Tempelmann-Maczynska 1985:Type 225); a mosaic face bead from the King Mich'u tomb area near Kyongju, Korea, from the fifth or sixth century A.D. (B.-S. Han 1973:26; Francis 1985a:13-14); a few Roman eye beads in northwest India (Beck 1941:23-26); at least one Roman bead at Arikamedu (Francis 1987a:6); a few others in China along the Silk Route (Liu 1975:11); possibly some at Oc-eo; a mosaic bead from Johore Lama in the Gardner collection; and probably the three poorly made face beads from Klong Thom, Thailand (Srisuchat 1987).

The literature, however, often mentions Roman glass beads in Southeast Asia (e.g., Hsu 1948:2; W. T. Han 1948:19; Harrisson 1950:203-204; Lamb 1964; Villegas 1983:30, Chin 1984:49). Such mentions are primarily based on identifications made by Horace C. Beck, the pioneer of bead research, and the paper by Gardner (1937), so it is instructive to review this work.

Among beads owned by Rane Margaret of Sarawak, Beck identified several as Greek or early Roman (1930). One, the twisted square (L 27; Beck 1930:180) is now known to be modern; it is excavated only at American and late African sites (Francis 1979a:15). Four (K 15, K 16, L 20, L 21; Beck 1930:178, 180) are wound and decorated with simple zones (equatorial bands), a motif so easily made and so widespread

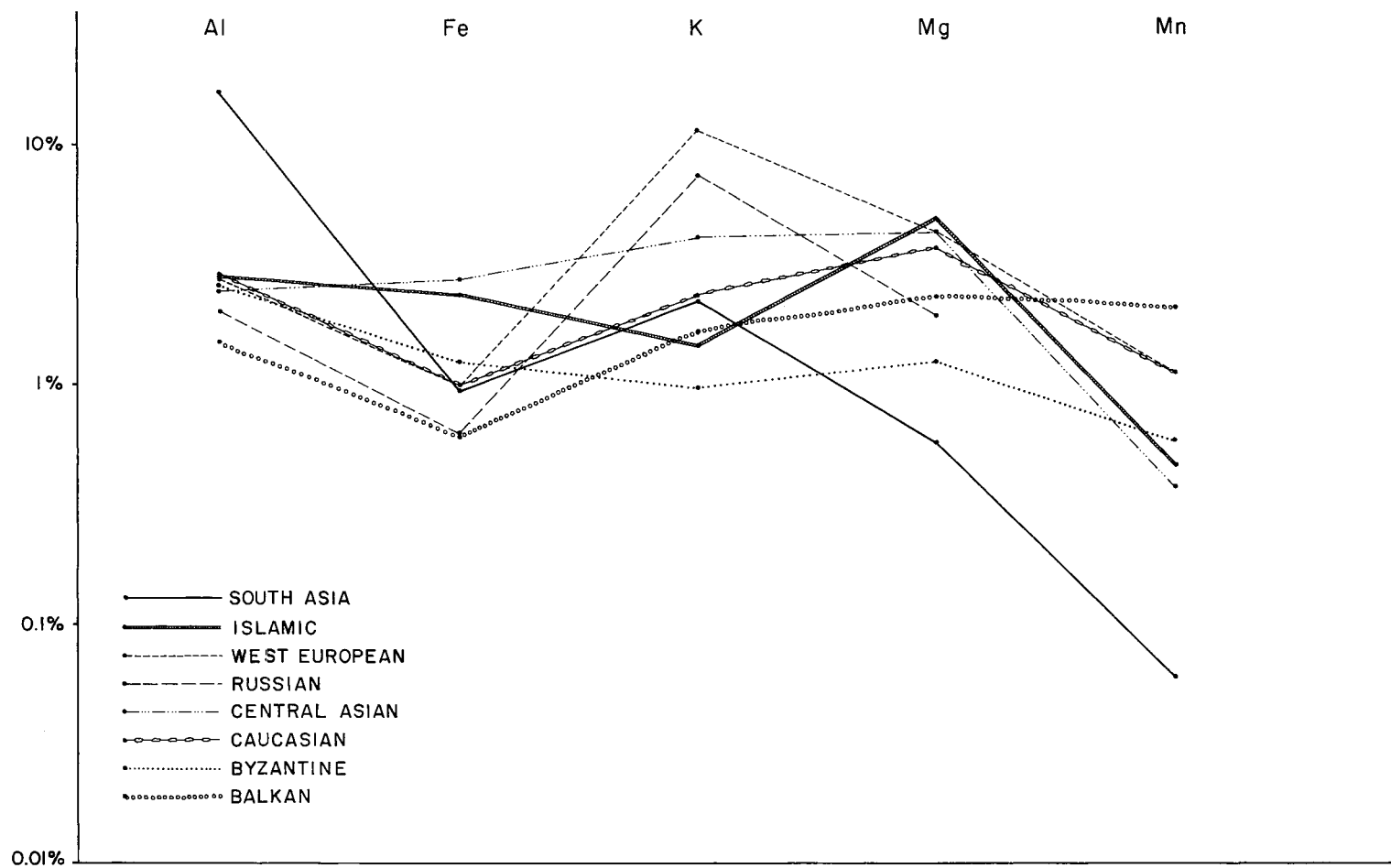


Fig. 4. Concentrations of selected ingredients in medieval glasses.

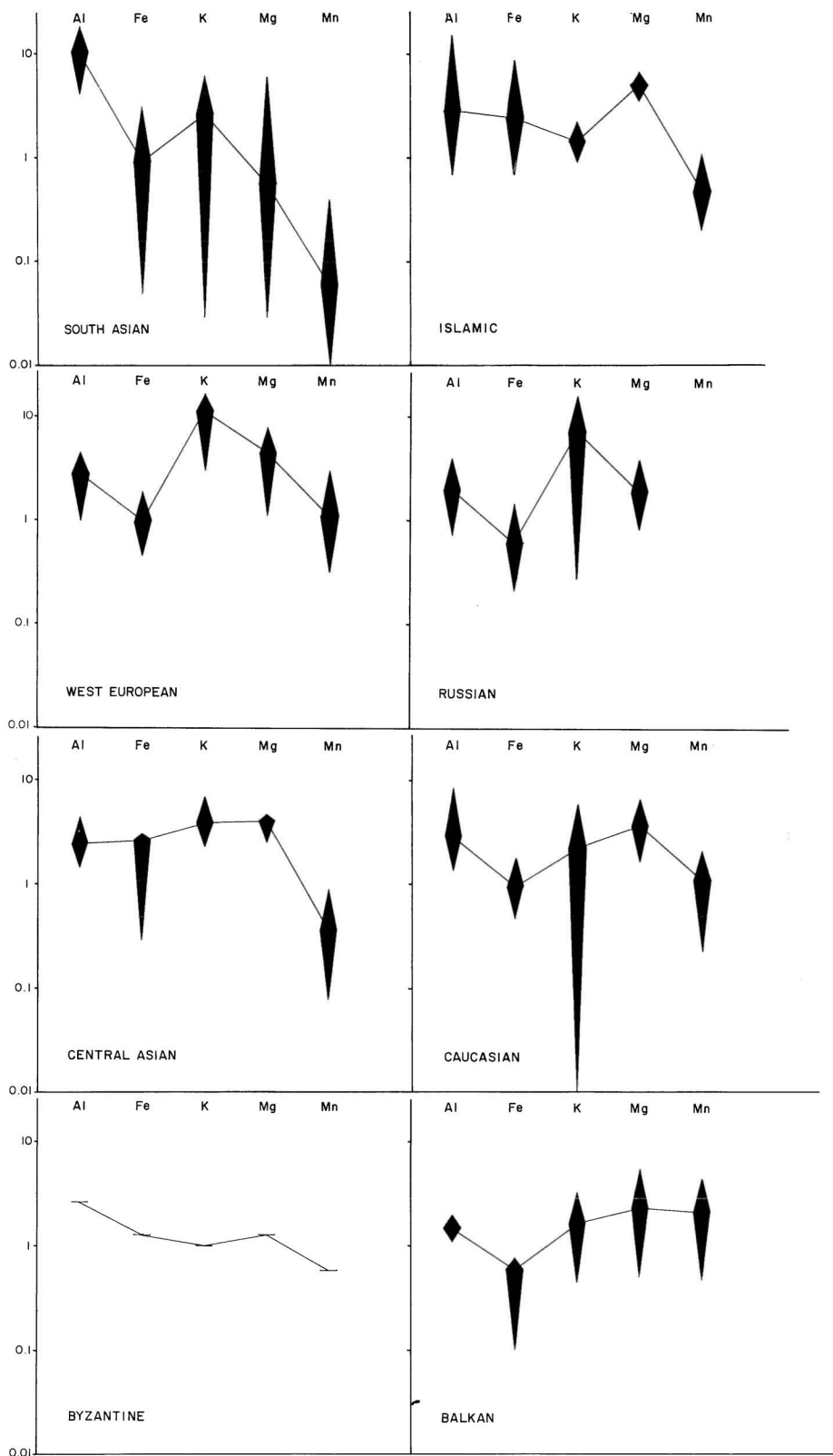


Fig. 5. Mean concentrations of selected ingredients in medieval glasses.

that identifying it as ancient must rest on more substantial grounds. The mosaic beads (K 18, K 19; Beck 1930:178–179) are Muslim imports, to be discussed in Part III of this study. One bead Beck did not identify appears likely to be medieval European: the chequer bead (K 21, L 19; Beck 1930:179), made from mosaic plaques with square elements. They are occasionally found around the Mediterranean in the early centuries A.D. (Goldstein 1979:273), but are most common north of the Alps through the Viking period (Stout 1986:58; Callmer 1977:98–99). They are known from nowhere else. Thus, only one Sarawak bead is unequivocally early European. It is notable, but isolated.

In 1937 Gardner reported on “Roman” beads picked up at Kota Tinggi and along the Johore River. Heralded as evidence of ties between Rome and Malaya, these “data” caused great excitement. He did not reveal the source of his identifications, but years later Lamb (1964) discovered notes written to Gardner in 1936 by Beck, which we can now reconsider. The numbers used here are Beck’s as published by Lamb.

Beck discussed 59 beads (excluding one he received later), but called only 8 Roman or Mediterranean, several of them tentatively. Two types, a gadrooned sphere or melon bead (#7) and black oblates with white zones (#22), have extremely long histories, as he noted. An identical black zone bead was found at medieval Pengkalen Bujang (Lamb 1965c:118). Beck said a pale blue bead (#40) was similar to Mediterranean types, but not of the same glass, and two blue beads (#41, 42) were “probably” Mediterranean.

Of the other “Roman” beads, a blown square green glass bead with raised crosses (#6) is a recent Czech (Bohemian) product, found on late-nineteenth-century sample cards (Francis 1979b:9); similar ones may have been made in Japan after World War II (Blair 1973:310). The chevron (a drawn bead with multicolored corrugated layers, #19) was once believed to be ancient (one led Morlot [1862] to conclude that the Phoenicians visited America). The myth of the antiquity of this bead is still perpetrated in popular articles, some less scholarly encyclopedias, and museum cases. There is no evidence for them predating the fifteenth century, and their antiquity can be disproven on technical grounds as well (Francis 1985b:43).

Finally, concerning #5, which is not glass but steatite, Beck said it is “called Hittite . . . not likely to be later than 700 B.C.” No archaeological evidence was cited, nor is any known to me. The bead stands alone.

As for the other beads, Beck recognized later “trade beads” (#12, 13, 14, 30), and noted parallels elsewhere in Asia (#20, 21, 23, 25, 55). Several (#33, 34, 39, 43–48, 50, 55) were called “heavy” or had specific gravities of 3.6 or more; they must contain lead. The unidentified molded “agate” octagonal barrel (#9) is Czech (Francis 1979b:10; Karklins 1982:35).

Despite Beck’s caution, Gardner unhesitatingly accepted that many of these beads were Roman. Lamb was less sure, noting that the ceramics were of Ming date (Lamb 1965c:117–118). He said that ancient beads could have gotten to the site by any one of several means, an argument earlier advanced by Gibson-Hill (1955:184). This is not in contention, but the evidence for its having happened has now evaporated.

Most of Gardner’s beads are in the Museum of Archaeology and Anthropology at Cambridge University. They went to G. Sieveking, Gertrude Caton-Thompson, and W.G.N. van der Sleen, who mounted and commented on them (van der Sleen

1956). It is a very mixed group, including Czech, Chinese, and Indo-Pacific beads. Those van der Sleen called Roman or Coptic (*faience melons* and *trail-decorated wound beads*) are Islamic. There is one Roman mosaic bead, and beads that look like dynastic Egyptian *faience*, but their presence is anomalous, and one can only wonder how they got into this collection (personal observation).

Beck also commented on beads figured by Hose and McDougall from Borneo. In Harrisson's paraphrase: "Beck specified three of the typically Kayan beads . . . as Romano-Egyptian and one fairly early Egyptian" (1950:203–204). What Beck actually said was: "[Three] are of Romano-Egyptian type, [one] represents a type which has been found in Egypt, where it is of considerable antiquity . . . but the type persists very much later and seems to have been exported to the Far East in some quantity" (Seligman and Beck 1938:15).

In sum, there is scanty evidence for Egyptian, Egypto-Roman, Greek, or Roman glass beads in Asia. The few mentioned at the beginning of this section do not indicate a regular trade in Roman beads to Southeast Asia. The question is not closed, but the evidence is no longer convincing.

### MODERN EUROPEAN BEADS

From the beginning of the European Age of Exploration, glass beads were sent in large numbers to Asia. The flood badly weakened the Indian bead industry (Francis 1982a:5–6, 1982c), and no doubt others as well. Europe made a wide variety of beads, and many of them are still in circulation.

For archaeologists concerned with early historic or medieval Asian sites, it might at first appear that there could be little interest in modern European beads. However, this view would be short-sighted. Not only are they important from an ethnographic point of view, but modern beads have a way of becoming part of the archaeological record as well. The preceding discussion of beads once heralded as Roman included only a few of many examples that can be cited of modern beads being misidentified as ancient (Francis 1987a:6–7, 1987b:21–23, n.d.b). It is incumbent upon archaeologists to be aware of beads made by modern industries. To give some idea of the range of such beads found in the region, some examples of misidentifications in the archaeological and ethnographic literature follow. (See Plate I).

Venice, Italy, became the leading European glass beadmaker from about 1500. Most of these beads either were drawn or were wound and given polychrome decorations. In the region there are many of the latter, once thought most exotic. Precise parallels can be cited for many, but this is often not so easily done, because of either poorly published examples or the enormous variety of trade beads made over several centuries. To avoid too much detail, it should be sufficient to say that most Sarawak beads pictured by Beck (1930) and Chin (1984:32), and the polychromes (except the *checquer* bead) shown by Munan-Oettli (1983:95, 1988), along with some Taiwanese (Chen 1968: pls. 78 G, 78 K) and Philippine beads (Villegas 1983:29, 33, 34), and nearly all beads I have seen from ethnographic contexts in Southeast Asia have their counterparts on Venetian trade bead sample cards, especially Museo Vetrario di Murano (n.d.:8–13), Fratelli Giacomuzzi (n.d.), the Francis Greil cards at the Peabody Museum, Harvard, and in Karklins (1982).

In the late 1700s, Gablonez, Bohemia (Jablonce nad Nisou, Czechoslovakia), be-



Pl. I. European beads of the last few centuries of the types found in Asia. The top row (left to right) contains a polychrome wound bead, a drawn hexagonal tube with the corners ground off (at least some are Czech), a wound "feather" combed bead, and two pre-1580 Venetian drawn chevron beads. In the middle are two red-on-white drawn Cornaline d'Allep beads, a wound reddish brown bead with square cells of twisted white cane and "eyes," and a wound bead decorated with longitudinal stripes. On the bottom are a wound bead with twisted white cane "eyes," a wound bead with a combed "feather" pattern, a molded hexagonal disc imitating carnelian, and a molded bead imitating onyx. All the wound beads are Venetian, and the molded beads Czech. Photo: Peter Francis, Jr.

gan making glass beads. By 1860 the Bohemian beadmakers were outselling the Venetians, using innovative technology to imitate precious and prosaic materials and to copy highly valued old beads (Francis 1979*b*). Virtually unknown until recently, Bohemian beads had not been studied, and hence were often published unrecognized. They were principally manufactured by molding, which leaves a seam that was sometimes ground down. The Bohemians were masters at copying other peoples' beads and bead materials.

There are many Bohemian/Czech beads in the region, including several published by Gardner from Kota Tinggi, as we have seen. At the same site, Lamb found similar beads and some new types (Lamb 1965*a*: 37, 1965*c*: 90–91, 1966: 92), mostly Bohemian: a molded hexagonal tabular imitating carnelian, a molded green variegated barrel he thought imitated jade (Francis 1979*b*: 10, pls. I.4,5, II.9), and probably also the imitation agate and imitation amber, the beads molded "in the shape

of human molar teeth," and the "Chinese attempt to imitate a mutisalah bead." At Oc-eo a heart-shaped pendant and a round tabular, both with impressed designs, were found; it was realized they were late because of the Qornic inscription on the pendant (Malleret 1962:265). Wheeler published a glass toggle bead from Arikamedu as "Post-Arretine" (1946:101, fig. 41.39). It certainly is: it is modern Czech. At least some of the cornerless hexagonal tubes in the Philippines (Villegas 1983:29) and a bead figured by Chen from Taiwan (1968: pl. 78 M) are also Czech.

Some beads were made at more than one European center. Those of clear red glass on opaque white (e.g., Malleret 1962:269–270), known as "Cornaline d'Allep" in the bead trade, were and still are made in Venice, France, and Czechoslovakia (Francis 1979a:13, 1979b:10–11; Bovis Bead Co. n.d.). The Dutch made glass beads during the seventeenth century, which were often similar to Venetian products (Karklins 1974, 1985). Beads found in Taiwan (Chen 1968: pl. 76 I–K) may be Dutch or Venetian, as might be twisted square beads found in Sarawak (Beck 1930:K 27) and Indonesia (personal observation).

Translucent "ruby" red glass such as Cornaline d'Allep beads or the Oc-eo heart pendant are notable. Dusky translucent copper red glass was produced in the twelfth century or so (Arnold 1913:33; Turner 1956a: Table VII), but ruby glass made with gold dates only from the late seventeenth century (Weyl 1959:380–384). Hirth and Rockhill (1911:73) translated Chau Ju-Kua (1225) as saying that it was obtainable in Ceylon, but Chinese scholars tell me that the passage says nothing about translucent red beads. Dikshit believed it was produced in ancient India (1969:58), but he apparently saw intrusions. Copper red glass in Southeast Asia is likely Chinese (personal observation). Until further evidence emerges, "ruby" glass should be considered recent.

To cite a final case, Villegas's ordering of Philippine beads (1983:29–38) ascribed several to areas not likely to have made them. Drawn multilayered chevrons were called Syrian, but the ones with ground facets at the end predate 1580 and were made in Venice (M. Smith 1977). Syria was also credited with a white bead with combed loops, called a "Ming bead" (Abellera 1981:170) or "squiggle" (Kelly and Johnson 1979); it is Venetian (Francis 1980; Karklins 1982:36, 56, 70). Cornerless hexagonal blue drawn beads ("Russian beads") were called Dutch, but they are Czech and have no parallels in Dutch material (Karklins 1974, 1985). A combed oblate was ascribed to India; this decoration is seen only on very recent Indian beads. The jet is more likely to have been Spanish than English. "French jet" (imitation jet of black glass) is largely, but not exclusively, a Czech product (Francis 1979b:10). Pointing out such misunderstandings is not intended to criticize or discourage further work, but to indicate how much needs to be done.

The problem of glass beads made in Europe during the last few centuries is of worldwide significance. Such modern beads not only constitute an important segment of "heirloom" beads, or those discussed in the ethnological literature, but also are frequently encountered at archaeological sites. In countries that have major bead-making industries, such as India, modern beads locally produced constitute a parallel problem. Once the problems are acknowledged, solutions must be sought so that similar mistakes are minimized in the future. Three broad characteristics can be useful to identify modern beads. When two or more of them fit a particular bead, its ascription to the modern period can be advanced with considerable confidence.

1. *The bead is made by a technique not used in ancient times.* The most glaring ex-

ample of this is true molding; very few ancient beads were even pressed into crude molds. Molded beads generally suggest Bohemian/Czech manufacture or one of the several industries that have been derived from this source.

2. *The bead is made in a material not used in ancient times.* Plastic beads in Mesolithic contexts (yes, it happens) are generally recognized for what they are. Glass is more difficult, but the colorants in glass can yield information. For example, we have pointed out that ruby (translucent red) glass is to be regarded as a modern product. A strident red in translucent or opaque glass usually indicates selenium, an element not identified until 1817 and not successfully used in glass until 1891 (Weyl 1959: 282–283; Trifonov and Trifonov 1982:104). Uranium in glass often produces a distinctive green or yellow-green translucent product; the Bohemians especially began to use it soon after its isolation in 1789 (Weyl 1959:205; Trifonov and Trifonov 1982:71).

3. *The bead has parallels with modern products but not with ancient ones.* A growing body of literature is available for comparisons with modern beads, much of which is cited in the references.

## SUMMARY AND CONCLUSIONS

In this introduction we have principally treated the question of non-Asian influences on Asian bead assemblages. Since it is equally dangerous to assume that all beads from a particular site were locally made as it is to assume that they were all imported, sifting the evidence to determine what may be considered local or at least Asian in origin and what may have been imported from outside the area is a necessary first step in studying Asian glass beads.

The small drawn Indo-Pacific beads definitely appear to be of Asian origin. The analyses of a number of them from both the early historic and medieval periods from a variety of sites show that they are made of a glass that is unlike glass produced in contemporary glassmaking regions of the West.

The often cited evidence for Roman glass beads in Southeast Asia disappears when examined critically. There certainly are Roman beads along the Silk Route in China and in northwestern India. Otherwise, the sites that have yielded Roman beads—such as Mantai, Sri Lanka, Arikamedu, India, Kyonju, Korea, and possibly Oc-eo, Viet Nam—all have only a very few such beads, and usually only single finds. The checquer beads of Sarawak may be medieval European in origin. Ancient European glass beads in Asia west of the Indus or beyond the Silk Route are extremely rare.

On the other hand, modern European glass beads of the last few centuries are quite common. They have been found and published from many sites and constitute an important intrusive element. Many of the heirloom beads of Southeast Asia and quite a few archaeologically recovered beads are of this type, usually Venetian, Bohemian/Czech, or possibly Dutch. Both ethnographers and archaeologists must recognize them for what they are in order to make sense out of a given assemblage.

Modern European glass beads aside, most glass beads in South Asia and East Asia appear to have local origins. These will be the subject of the following parts of this series. Part II will discuss the common Indo-Pacific beads, and Part III beads of other types.



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## APPENDIX

*Sources for Data Used in the Tables and Figures*

Analyses from many different sources can never be strictly comparable. Some data were refigured to make them more comparable, such as when metals rather than the oxides were reported.

**Table 1.** The Arikamedu analyses come from Subramanian (1950), Lal (1952: 25–26), Tornati and van der Sleen (1960:23), and Lamb (1965*c*:98–100). Those for Oc-eo come from Malleret (1962:463–469), using only *grains spheroides*. The bead from Kampong Sungei Lang, Malaysia, was collected by Peacock and published by Lamb (1965*c*:99). The bead from Pasamah, Sumatra, was published by van Heekeren (1958:44). The beads from Thao Kham and Ban Xot III, Laos, and Sa-huynh, Annam (Viet Nam) were published by Colani (1935: vol. 2, 155, 304–305).

**Table 2.** This includes data from Kuala Selingsing and Bukit Maras in Harrisson (1964:38), Painted Cave from Harrisson (1968:128–130), Pengkalan Bujang and Takuapa in Lamb (1961*b*:55), Flores in Tornati and van der Sleen (1960:23), and Kuala Selensing in Colani (1935: vol. 2, 155, 305).

**Figures 2 and 3.** The data on the Asian material are derived from Table 1, developed for this paper. The Roman glass data come from Turner (1956*a*: Table IV), and those for late Egyptian glass from Turner (1956*a*: Table III).

**Figures 4 and 5.** The data for the Asian material come from Table 2, developed for this paper. For the Islamic glass, the Al and Fe data come from Turner (1956*a*: Table VI) and Lucas and Harris (1962:477), while the Mg, Mn, and K figures come from R. W. Smith (1963:520), because his is a much larger sample, although it did not include Al or Fe values. The data for Western Europe are from Turner (1956*a*: Tables VII, VIII). For Russian glass, the nonlead glasses were used from Besborodov (1957) and Besborodov and Zadneprovsky (1965: Tables III, IV). The Central Asia data are from Besborodov and Zadneprovsky (1965: Table II), for the Caucasus from Besborodov and Zadneprovsky (1965: Table I), for Byzantium from Djingov (1964: Table II), and for the Balkans (Bulgaria) from Djingov (1964: Table I).

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